

classification true for any large area be made on mineral character.

But since the mutations in physical geography determine both the rock-material and the distribution of life, there is in them a philosophical basis for classification, which indicates the value alike of mineral character and of fossils. Yet classifications, though made on the most fundamental considerations, can never be carried from a typical locality all over the world, because the world has neither life, nor mineral character, nor stability of physical geography in common with the typical locality.

The proof, extension, and practical application of the cosmogeny here sketched will be given in the first volume of the 'Principles of Palæontology,' which is devoted to the dynamical geology of Britain.

L.—*Synopsis of the Species of American Squirrels in the Collection of the British Museum.* By Dr. J. E. GRAY, F.R.S., V.P.Z.S., &c.

THE species of American Squirrels are more difficult to define distinctly than those of Asia or Africa, arising from the various colours which the same species presents, even in individuals of the same family; thus Bachmann states, "Nothing is more common than to find the same litter composed of grey, black, and fox-coloured young."

Dr. Spencer Baird, in his well-studied essay on the Squirrels of North America, has shown that some species of the larger North-American Squirrels (as *Sc. vulpinus*) have a tendency to run into ferruginous varieties, and to have red bones, while other species (as *Sc. carolinensis*), of a yellow-grey colour, are very commonly affected with melanism, and have more or less black fur.

Both *Sc. vulpinus* and *Sc. carolinensis* vary, on the under surface of the body, from pure white to rufous or black.

Dr. Spencer Baird observes, as a general rule, that, where a squirrel exhibits any annulations of the hair on the fur of the throat or belly, it is a variety of some species which, in its normal form, has the under part either of a uniform white or reddish colour to the base, or only plumbeous at the roots.

The hairiness of the soles of the feet varies, especially in the species which inhabit the northern region of America, or which have an extensive geographical range there. Dr. Spencer Baird describes specimens of *Sciurus vulpinus* "with (1) the soles naked, (2) the soles hairy between the pads nearly to the end

of the metatarsus, (3) with a small patch of hair only in the centre of the sole." (Mamm. N. A. 247.)

It has been observed that in the species which have an extensive geographical range there is a difference in the average size of the species, agreeing with the latitudes which it inhabits. Thus several of the North-American Squirrels become smaller as they extend southward, until, on the sea-coast of Georgia, Florida, and the Gulf, they reach the minimum size.

There are some species and some local varieties that appear constant, and present very little variation in outer appearance; and I have no doubt the difficulties which we experience in studying the specimens in museums would immediately vanish if we could study the animals in their native haunts.

The colour of the back is very liable to vary, especially in the larger species. In *Sc. vulpinus* it varies from pale iron-grey to nearly black, and, on the other side, to fulvous brown grey. *Sc. carolinensis* varies from pale iron-grey to fulvous; and a melanic variety of a nearly uniform black colour is common.

The colour of the underside is quite as variable in some species. *Sc. vulpinus* and *Sc. carolinensis*, which have the underside normally of a pure white colour, sometimes have it deep black, and at others reddish or reddish white. Several species, especially of the smaller kind, which have the underside of a reddish colour, have it sometimes much paler, and at others white with a yellow tinge, or nearly white.

Many species have a tuft of soft hair at the base of the ears: this is usually white or yellow, according to the species; but I have seen it white on one side and yellow on the other in the same specimen.

The colour of the tail is generally characteristic of the species; but in some kinds it is variable, though the variations are confined within certain limits in each species. The size of the dark band on the hairs of the tail and the general colour of the hairs constitute a pretty permanent specific character; but it sometimes varies: the base-colour changes from grey to deep yellow or white; and the black band is sometimes diffused so as to make the tail almost, and sometimes entirely black, or black with a minute pale tip.

It is almost impossible to give a definite character for the species in a few words; each individual requires to be described.

2. SCIURUS.

Gray, Ann. & Mag. Nat. Hist. 1867, xx. pp. 271, 272, 325.

Ears tufted. Head broad; muzzle short. Feet hairy at the heels. Front upper molar small or often wanting.

Some of the North-American squirrels which have tufted ears in winter are said to have smooth ears in summer; but I have not seen any specimens showing this peculiarity. Many species, indeed most, have a tuft of soft hairs at the outer base of the ears, and the ears themselves are covered with short close-pressed hairs; and this tuft may be more distinct at certain seasons.

I. *Large-sized, grey.*

* *Lateral streak black, dorsal streak red.* No. 1. *Sc. Alberti*.

** *Lateral or dorsal streak none.* No. 2. *Sc. cinereus*.

II. *Middle-sized; fur soft.*

* *Lateral streak distinct, lead-coloured; beneath white.* Nos. 3, 4.

** *Lateral streak distinct, black; beneath red.* No. 5.

*** *Lateral streak none; beneath red.* No. 6.

I. *Large-sized, grey.*

* *Lateral streak distinct, dorsal streak red.*

1. *Sciurus Alberti*.

Sciurus dorsalis, Wood, Proc. A. N. S. Philad. 1852, vi. 110 (not Gray).
Sc. Alberti, Woodhouse, Proc. A. N. S. Philad. 1852, v. 220; Selgrave's
 Zool. Exped. 1853, p. 53, t. 6; Audub. & Bach. Quad. N. Am. 1854,
 iii. t. 153. f. 1; S. Baird, M. N. A. 267.

Fur finely grizzled black-grey and black; beneath and feet white; a dark line on each side of the belly; back with a pure chestnut streak; tail black and white mixed, beneath white; ears tufted.

Hab. New Mexico, San Francisco Mountains (Dr. Woodhouse). Mus. Smithsonian Institution.

See also *Sc. castanonotus*, Baird, M. N. A. 266, t. 65. f. 81, 82. *C. (castanonotus)*. Similar, but with the ears without tufts. Perhaps a *Macroxus*.

** *Lateral or dorsal streak none.*

2. *Sciurus cinereus*.

Sciurus cinereus, Linn., Aud. & Bach. Q. N. A. i. 145, t. 17; Baird, M. N. A. 248, t. 48. f. 2.

Sc. vulpinus, Schreb. iv. t. 215 B.

Sc. virginianus, Kerr.

?*Sc. hyemalis*, Ord.

Fur light grey above, beneath white; head broad, muzzle short; ears grey, short, scarcely longer than the adjacent fur, never white, covered with hair and fringed with longer hairs.

Hab. North America, Pennsylvania. B.M.

Var. 1. Blackish, very minutely punctulated with white ; hairs lead-coloured at the base, brown above, with a narrow black subterminal band and white tip ; crown blacker ; underside reddish grey, slightly grizzled ; tail black (or brown), hairs black or brown, with slender white tips to some. North America. B.M.

Var. 2. Hairs black, with a very small narrow subterminal grey ring. B.M.

Var. 3. Hairs black, shining, uniform. B.M.

II. *Middle-sized ; fur soft.*

* *Lateral streak lead-coloured ; tail narrow, shorter than the body.*

3. *Sciurus hudsonius.*

Sciurus hudsonius, Pallas, Baird, M. N. A. 269, t. 46. f. 2.

Sc. carolinus, Ord.

Sc. rubrolineatus, Desm.

Tamias rubrolineatus, Schinz.

Tamia hudsonia, Lesson.

Fur black and greyish rusty ; back often washed with ferruginous ; tail beneath and towards the tip uniform ferruginous, with roots of the hairs not annulated.

Carlton House (male, large) : B.M. Fort Simpson, Mackenzie River (Ross) : B.M.

See *Sciurus Fremontii*, Aud. & Bach. Q. N. A. iii. 237, t. 149. f. 1. "Fur above black and greyish rusty yellow, without any tinge of ferruginous ; tail black or greyish white, without any ferruginous visible externally, glossy black near the tip." (S. Baird, M. N. A. 246, 272.) Rocky Mountains, Sawach Pass. Mus. Smithsonian Institution.

4. *Sciurus Richardsonii.*

Sciurus Richardsonii, Aud. & Bach. Q. N. A. t. 5 ; Baird, M. N. A. 273.

?*Sc. lanuginosus*, Aud. & Bach. Q. N. A. t. 25 (immature).

Sc. hudsonius (part.), J. K. Lord, Report.

"Fur reddish brown and black finely mixed ; back not washed with ferruginous, beneath white ; tail dark reddish brown toward the base of the hairs, the exterior portion of the sides and entire tip glossy black."

Hab. Vancouver Island (J. K. Lord) : B.M. Cascade Mountains (J. K. Lord) : B.M. West Slope, Rocky Mountains (J. K. Lord) : B.M.

** *Lateral streak black ; underside rusty or reddish.*

5. *Sciurus Douglasii.*

Sciurus Douglasii, Gray, P. Z. S. 1836, p. 88 ; Aud. & Bach. Q. N. A. ii. t. 48 ; Baird, M. N. A. 275, t. 20. f. 1, t. 45. f. 2.

Sc. Townsendii, Bach.

Sc. Belcheri, Gray, Ann. & Mag. Nat. Hist. 1842, x. p. 264; Zool. Sulph. t. 12. Var., *S. Suckleyi*, Baird, M. N. A. t. 7.

Sc. mollipilosus, Aud. & Bach. Q. N. A. t. 19.

?*Sc. Fremontii*, Aud. & Bach. Q. N. A. t. 149. f. 1; Baird, M. N. A. 272, t. 6.

Fur rusty and black mixed, beneath clear bright buff; tail dull chestnut centrally, darker above, then black and margined all round with rusty white; hairs of the tail black, except at their extremities.

Hab. California (Douglas, Gray, type in B.M.). Vancouver Island, ♀, dark brown (November, J. K. Lord, B.M.). Cascade Mountains (J. K. Lord, B.M.). British Columbia, edge of the Prairie (J. K. Lord, B.M., young).

Var. *Fremontii*. Paler, beneath reddish white; feet reddish brown, rather larger.

?*Sciurus Fremontii*, Aud. & Bach. Q. N. A. t. 149. f. 1; S. Baird, M. N. A. 272, t. 6.

Hab. Scott Mountains, Trinity Country, 500 or 600 feet above the sea-level (Brydges). B.M. Called *Pine-Squirrel*.

*** *Lateral streak none; belly red.*

6. *Sciurus hyporrhodus*.

Sciurus astuans, Gray, List. Mamm. B. M.

Fur very soft, abundant and long, above reddish olive, minutely punctulated with bay and black; hairs lead-coloured, with short yellow ends and a narrow subterminal black band; side of nose, cheeks, chin, throat, underside of the body, and inner side of the limbs red bay; hair black at the base, with red ends: tail black, indistinctly yellow-ringed, reddish-washed; hairs yellow, with three black bands, the upper broadest, and a reddish tip.

Hab. Santa Fé de Bogotá.

Known from all the other South-American squirrels by the softness and length of the hair and hairy ears.

3. *MACROXUS*.

Gray, Ann. & Mag. Nat. Hist. 1867, xx. pp. 271, 275.

Ears generally have a small tuft of short woolly hairs at the outer hinder part of the base. This is not to be observed in *M. astuans*. Soles of the feet generally bald; but some of the northern species have the soles covered with short hair, except on the long pad on the inner edge, and near and on the pads at the bases of the toes.

The species may be divided geographically as those found north or south of the Gulf of Panama: the northern species

are generally iron-grey and of larger size; and the southern are olive, more or less punctulated with yellow, of middle size or small. There are one or two of the olive species found in the north as well as the south part of the isthmus.

- I. *Fur thick, soft, iron-grey, white- or yellow-washed, rarely entirely black; of a large or middle size. Inhabiting North America to Panama.*
 - A. *The fur iron-grey, or grey yellow-washed, or black; hairs black, often with white tips; tail blackish, grey-edged.*
 - a. *Belly white.* Nos. 1, 2, 3.
 - b. *Belly red or reddish white.* Nos. 4, 5.
 - c. *Belly black.* Nos. 6, 7, 8, 9, 10.
 - B. *The fur pale grey; hairs grey, black-ringed: or black, the hairs being entirely black.*
 - a. *Belly white.* Nos. 11, 12, 13.
 - b. *Belly yellow.* Nos. 14, 15.
 - c. *Belly red.* No. 16.
- II. *Fur short, soft, olive-brown, black- and yellow-punctulated, rarely red-washed; hairs black- and yellow-ringed. Moderate-sized or small. Inhabit South or Tropical America to Panama.*
 - A. *Tail black; fur very short, belly nakedish. Middle-sized.* No. 17.
 - B. *Tail black, red-washed; fur moderately soft.*
 - a. *Belly red; cheeks red.* Nos. 18, 19, 20, 21.
 - b. *Belly red or reddish; cheeks grey.* No. 22.
 - c. *Belly white; cheeks grey.* No. 23.
 - C. *Tail blackish or grizzled, grey-washed, or more or less annulated.*
 - * *Middle-sized. Belly white.* No. 24.
 - ** *Middle-sized. Belly reddish.* No. 25.
 - *** *Middle-sized. Belly dark grey.* Nos. 26, 27.
 - **** *Middle-sized. Belly yellow.* Nos. 28, 29, 30.
 - ***** *Very small. Belly grey or lead-coloured.* Nos. 31, 32.
- III. *Fur rather harsh, short; sides with a narrow reddish streak.* No. 33.
 - I. *Northern species, of a large or middle size. Fur soft, iron-grey, white- or yellow-washed, sometimes entirely black.*
 - A. *The fur iron-grey or black; hairs black, often with a white tip; tail blackish, grey-edged.*

1. *Macroxus vulpinus.*

Sciurus vulpinus, Gmelin, S. Baird, M. N. A. 246.

Sc. niger, Linn.

Sc. capestratus, Bosc.

Var., *Sc. texianus*, Bach. B.M.

Sc. rufigaster, Mac Murtrie. B.M.

Fur coarse and harsh, iron-grey, black, or rusty-coloured black-varied; ears and nose white.

Hab. North America, Southern States, Florida, Georgia, Louisiana: B.M. Texas: B.M.

Var. 1. Pale iron-grey; crown of head and cheeks black; beneath white; hairs of tail white, with a very broad subterminal black band and grey tip.

Var. 2. Blackish iron-grey; head, neck, shoulders, thighs, legs, and feet black; tail blackish, beneath white, lateral streak between the two colours black; hairs of tail dark grey, with a very broad black end.

Var. 3. Like var. 2, dark iron-grey; head, throat, underside, and body and limbs black; nose and ears white; feet white-varied; hair of tail white, with a subterminal black band.

Hab. Northern States.

Var. 4. Yellow, iron-grey-grizzled; crown blackish; sides of throat yellowish; belly white-yellow; hairs of tail yellow or reddish yellow, with a black subterminal band.

Hab. Texas: B.M. Louisiana: B.M.

2. *Macroxus Colliæi*.

Sciurus Colliæi, Richardson, Zool. Blossom, 1839, p. 8, t. 1; Aud. & Bach. Quad. N. A. 1853, iii. 21, t. 104; S. Baird, M. N. A. 280.

Sc. variegatoides, Ogilby, P. Z. S. 1839, p. 117; S. Baird, M. N. A. 283.

Sc. griseocaudatus, Gray, Zool. Sulph. 1834, t. 13. f. 2, t. 18. f. 7-12 (skull); S. Baird, M. N. A. 283.

Fur harsh, rather rigid, nearly uniform grey, more or less varied with black from the derangement of the hairs; hairs black, with a subterminal white band; cheeks and chin grey; tuft behind ears yellow, often very large; chest and belly white or deep yellow; tail black, washed with white; hairs yellow, with a black subterminal band and a white tip.

Hab. Central America.

Var. 1. Under surface yellow; ear-tuft red; feet reddish.

Sciurus variegatoides, Ogilby, P. Z. S. 1839, p. 117.

Sc. griseocaudatus, Gray, Zool. Sulphur, t. 12. f. 2.

Hab. West coast of America (Belcher, Ogilby, type in B.M.; Gray, type in B.M.).

Var. 2. Sides of the body and neck and outer and inner sides of limbs bright rufous; throat, chest, and the middle of the belly white.

Sciurus intermedius, Verreaux.

Hab. Guatemala (Verreaux). B.M., type.

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Var. 3. Under surface white; ear-tuft white or yellow; feet grey, black- and white-punctulated.

Sciurus Collicæi, Richardson, *l. c.*

Hab. California (Richardson, type in B.M.). Guatemala, West Coast (O. Salvin): B.M. Mexico: B.M.

Var. 4. Under surface pure white; ear-tuft large, red; feet black (not punctulated).

Hab. Mexico, province of "Amoa" (Amoea?).

3. *Macroxus dorsalis*.

Sciurus dorsalis, Gray, P. Z. S. 1848, p. 138, t. 7.

Black; crown, sides of neck, and body and limbs white; ear-spot large, white; chin, throat, sides of neck, underside of body, and inner side of limbs white, yellow-white, or reddish brown; hair black; fur white- or yellow-varied, with a white tip.

Hab. Costa Rica.

Var. 1. Sides and underside pure white.

Hab. North America, Nicaragua.

Var. 2. Underside yellowish white; chin and throat white, sides white, black-varied.

Hab. Santa Fé, Veragua (O. Salvin). B.M.

Var. 3. Underside and chin, cheeks, sides of body, and limbs pale yellow.

Var. 4. Back more or less brown-varied, especially behind; outer sides of legs reddish-washed; cheek, throat, and sides of the body white-varied; chest, belly, and inner sides of limbs rufous.

Hab. Costa Rica, Nicoya (O. Salvin). B.M.

Var. 5. Like var. 3; but the lower part of the sides of the body with a broad, reddish, black-and-white-dotted streak (like the outer sides of the limbs) under the white on the sides of the body; chest with a short white central streak, and the circumference of the teats grey.

Hab. Costa Rica, Nicoya (O. Salvin). B.M.

Var. 6. Head, sides, limbs, feet, and beneath uniform rufous; middle of the back black; tail black, with white tips to the hairs.

Hab. Nicoya? (O. Salvin). B.M.

There is a young specimen in the British Museum, said to come from *Honduras*, which is like the adult; but the fur is black by the length of the black tips to the hairs; the tail is black, white-washed, with long white tips to the hairs.

4. *Macroxus nicoyana*.

Fur rather thick and abundant, yellowish iron-grey; hairs black, with a broad subterminal white band; shoulders, thighs, legs, and sides of the body rufous-washed; tail black, very slightly punctulated; head white iron-grey; cheeks and chin pale grey; ear-tuft large, white; throat, underside, and inner sides of the legs bright red brown, varied with large white subsymmetrical blotches: tail black, white-washed, hairs black (those of the underside of the tail more or less brown at the base), with a long white tip. Head and body 12 inches long.

Hab. Costa Rica, Nicoya (O. Salvin). B.M.

The white on the underside is perhaps an individual peculiarity.

5. *Macroxus aureogaster*.

Sciurus aureogaster, F. Cuv. Mamm. Lithog. lxx. t.; Geoff. Voy. Venus, Zool. 1855, p. 136, t. 10, 11.

Sc. leucogaster, F. Cuv.; Sp. Baird, M. N. A. 282.

Dark iron-grey; crown of head, nose, and feet blacker; sides of the body, throat, chest, belly, inner sides and edges of the limbs red brown; hairs black, mixed with grey or red tips: tail bushy, black, white-washed; hairs red yellow at the base, then black, with long grey tips.

Hab. Columbia.

Var. 1. Red, darker chestnut on the shoulders and front part of the back; hairs of tail black at the base, with a yellowish ring, and then black, with grey tips.

Var. 2. Fur with a redder tinge; hair lead-coloured, then rufous, with black rings and grey tips; nape, shoulders, rump, and outer sides of thighs reddish; tail-hairs red at the base, then black, with grey tips.

Sciurus aureogaster, I. Geoff. Voy. Venus, t. 11, ♀.

Hab. "Mexico" (F. Cuvier). South America (Verreaux): B.M. Columbia (Parzudaki): B.M.

These squirrels were received from Parzudaki and Verreaux as the *S. aureogaster* of F. Cuvier. The last variety is somewhat like I. Geoffroy's figure of the female in the Voy. of the Venus, t. 11.

I have not seen any specimens like those figured as varieties of the same species in tab. 10 of that work, which appear to be nearly white, with reddish nape and rump, the colour of the underside not being shown.

See also—

1. *Sciurus hypopyrrhous*, Wagler, Isis, 1831, p. 510; Baird, Rep. 282. *Hab.* Mexico.

2. *Sciurus variegatus*, Erxl. Syst. 1777, p. 421; Baird, Rep. 282. (*Coquallin*, Buffon.) *Hab.* Mexico (Erxl.).

6. *Macroxus morio*.

Fur very abundant, long, soft, black; head, middle of the back, rump, and outer side of thighs very minutely white-dotted; underfur brownish, longer; hairs black to the base, those of the head, rump, and thighs with a minute white tip: cheeks and chin greyish; throat, inner side of limbs, front edge of thighs, and hinder part of the belly red-washed; hairs of these parts red to (or nearly to) the base: tail black, slightly white-washed; hairs black, some of them with an elongated white tip; hinder part of the base of the ears grey.

Hab. —? In Zoological Gardens, where it lived several years, and remained always of the same colour. B.M.

The red-brown front of the thighs and the very general punctulation of part of the body give it a very peculiar appearance.

7. *Macroxus Boothiæ*.

Sciurus Boothiæ, Gray, List M. B. M. 139.

Sc. fuscovariegatus, Schinz, ii. 15.

Sc. Richardsonii, Gray, Ann. & Mag. Nat. Hist. 1842 (not Bachmann).

Fur soft, black-grey, minutely punctulated with white; ear-tuft small, grey; fore legs, feet, and end of tail black; underside rather pale, black-grey-punctulated; hairs of body black, with a grey subterminal band; hairs of tail black, with a subventral broad grey band and a short grey tip.

Hab. Honduras (Dyson). Gray's type in B.M.

The three preceding species are very nearly allied.

8. *Macroxus nigrescens*.

Sciurus nigrescens, Bennett, P. Z. S. 1833, p. 41; Aud. & Bach. Q. N. A. iii. t. 117; S. Baird, M. N. A. 280.

Black iron-grey; hairs black, with a small white tip; nose and ears pale grey; chest and belly like back, but with shorter brownish hair; feet black: tail black, grey-varied; hairs whitish grey at the base, end black.

Hab. California (Bennett, type in B.M.).

This specimen is in a bad state. It may be only a small variety of *M. vulpinus*, or a bad state of *M. variegatoides*, or distinct. The ears are in a bad state; but they appear as if they might have been more hairy than those of the usual *Macroxi*.

9. *Macroxus maurus*.

Fur very short, rather rigid, black; sides and sometimes the front of the back red-washed; head and rump minutely punctulated with white; tail black, white-washed; feet and fore legs black; hairs entirely black to the base, or black with a more or less wide red, yellow, or white subterminal band; the throat, chest, and inner part of the body rufous, more or less grizzled with black hairs; tail-hairs black, some with more or less distinct grey tips.

Hab. Mexico, Oaxaca (Sallé). B.M.

The two specimens vary considerably in colour; but they agree in the shortness, rigidity, and shining nature of the fur.

They are named *S. lanigerus*; but this must be a mistake, for they have a very small quantity of lead-coloured under-fur.

See *Sciurus (Macroxus) Peladii*, Lesson, Rev. Zool. 1842, p. 130; S. Baird, M. N. A. 282. *Hab.* Mexico, Realejo (Lesson).

10. *Macroxus melania*.

Fur uniform, rather rigid, close-pressed, polished black; hairs uniform black to the base, under-fur black, the longer hairs striated, polished; nape, back, and some spots on the sides of the hinder part of the back washed with brown, as if stained. Tail, feet, and underside of the body black.

Hab. West coast of America? Point Berica (Kellet & Wood). B.M.

This squirrel differs from all the black squirrels in the Collection by the shortness and rigidity of the fur, which has the polished appearance of the fur of the otter and other water-animals. The brown colour of the back may have been occasioned by the animal having been kept in confinement, or the skin having been stained.

B. *The fur pale grey; hairs grey, black-ringed: or black, the hairs being entirely black.*

11. *Macroxus neglectus*.

Fur pale iron-grey, nearly uniform; sides of nose, chin, inner sides of limbs, and underside of body, ears, and feet white; under-fur lead-coloured; hairs of back pale grey, with a black subterminal band and white tip: tail pale, white, black-varied and white-washed; hairs white, with two broad blackish bands and a long white tip; soles bald. Length of body 14 inches.

Hab. North America? ♀, B.M.

A heavy animal, as large as *Sc. vulpinus* and *Sc. cinereus*, very

like the latter ; but the ears are covered with short closely adpressed hairs. It differs from *Sc. vulpinus* in the hair not being black.

12. *Macroxus fessor*.

Sciurus fessor, Peale ; S. Baird, M. N. A. 264.

Sc. Heersmanni, Leconte.

?*Sc. leporinus*, Audub.

Fur soft, abundant, pale iron-grey, minutely black- and grey-punctulated ; hairs lead-coloured, with a small subterminal black band and grey tip ; chin, underside of body, and inner sides of legs white : tail broad, grey, black-edged ; hairs grey, with a broad black subterminal band and grey tip.

Hab. California (Bridges, B.M. ; Gurney, B.M.).

See also *Sciurus Nebouxii*, I. Geoff. Voy. Venus, t. 12. Very pale grey-grizzled, with black feet.

13. *Macroxus carolinensis*.

Grizzled light yellow, with occasional washes of rusty grey or blackish ; hairs lead-coloured at the base, upper half yellow, with a subterminal black band ; tail broad, pale iron-grey, black-varied and white-washed ; hairs yellowish, with a broad subterminal black band and a long white tip.

Var. minor. Southern States :—

Sciurus carolinensis, Gmelin, S. Baird, M. N. A. 256, t. 45. f. 2.

Var. major. Northern States :—

Sc. cinereus, Desm. *Sc. cinereus*, Schreb.

Sc. leucotis, Gapper, Z. Jour.

Sc. migratorius, Audub.

Sc. pennsylvanicus, Ord.

Var. niger :—

Sc. niger, Godman, Gray.

Sc. fuliginosus, Bachmann.

Var. Blackish.

Hab. North America.

14. *Macroxus ludovicianus*.

Fur soft, yellow iron-grey ; cheeks, chin, and beneath yellow ; head narrow ; ears high, never white ; tail yellow iron-grey, yellow-edged or washed ; hairs yellow grey, with three black bands and a yellow tip.

Sciurus ludovicianus, Curtis, S. Baird, M. N. A. 251.

Sc. rufiventer, Desm.

Sc. macroura, Say.

Sc. macrourus, F. Cuv.

Sc. macryourus, Godman.

Sc. magnicaudatus, Harlan.

Sc. Sayi, Aud.

Sc. subauratus, Bach. Type in B.M.

Sc. rubricaudatus, Aud.

?*Sc. limitis*, Baird.

?*Sc. Lewisii*, Ham. Smith.

Hab. Louisiana (Bachmann) : type in B.M. Missouri : B.M.

Var. Dusky.

Sciurus Audubonii, Bachmann.

Sc. occidentalis, Bachmann.

Hab. Illinois.

See 1. *Sciurus limitis*, Baird, M. N. A. 256, t. 64. f. 81. f. 1.

Hab. Texas. Much smaller than *S. ludovicianus*, and the prevailing colour cinnamon.

2. *Sciurus lanigerus*, Aud. & Bach. Quad. N. A. 1849, i. 27 ; S. Baird, M. N. A. 280. *Hab.* Northern California.

15. *Macroxus griseoflavus*.

Fur abundant, rather thick, nearly uniformly coloured yellowish grey, yellow, white, and black mixed ; nose and front of crown whiter ; cheeks and chin greyish white ; ear-tuft dirty white ; throat, chin, belly, and inner side of the limbs yellow red ; feet white and black equally mixed ; hairs of back lead-coloured, upper half brown, with a black subterminal band and a white tip ; tail pale brown, white-washed ; hairs grey, with three blackish bands, the last subterminal with a long white tip.

Hab. Tropical America, Guatemala (Salvin). B.M.

Somewhat like *M. leucops*, but paler, more uniformly coloured, and the colour of the hairs quite different ; orbits not white ; chest yellow red.

16. *Macroxus leucops*.

Fur abundant, very soft, yellowish grey, minutely yellow-, white-, and black-varied ; crown, nape, and rump yellow-washed ; hairs long, lead-coloured at the base, brown above, with a narrow black band and white tip ; nose and cheeks grey ; ear-tuft, orbits, chin, throat, and feet white ; chest, belly, and inner sides of the limbs bright red ; tail very bushy, black, white-washed, with irregular black rings ; hairs slightly yellow at the base, with a very broad black band and long white tip.

Hab. North America, Mexico, Oaxaca (Sallé). B.M.

Var. The lower half of the hairs of the tail orange-yellow.

Hab. New Granada ? B.M.

Wagner (Abh. K. Bay. Akad. ii. 500) describes two squirrels from Oaxaca as *S. albipes* and *S. socialis*, the first $10\frac{1}{2}$ inches long, with rigid hair, the second $8\frac{1}{2}$ inches long, with softer

hair: he gives an uncoloured figure of the latter; but it will do for any squirrel; the latter can scarcely be the one here described. The Museum specimens are much larger, the body and head being $11\frac{1}{2}$ or 12 inches long.

See also:—

1. *Sciurus varius*, Wagner, Suppl. Schreb. 1843, iii. 168; S. Baird, M. N. A. 283. *Hab.* Mexico, Oaxaca.

2. *Sciurus albipes*, Wagner, K. B. Akad. iii. 500; Schreb. t. 213 D.

?*Sc. variegatus*, Erxleben, Syst. 1777, p. 421; Baird, M. N. A. p. 282.

Above mixed white, black, and ferruginous; beneath ochrey ferruginous, feet and shoulders brown; ears white; tail centrally ferruginous, on sides banded with black and white. *Hab.* Mexico.

3. *Sciurus socialis*, Wagner, Abh. K. Bay. Akad. ii. 504, t. 5; S. Baird, M. N. A. 283.

Above mixed white, cinereous, and yellowish; beneath pale rusty yellow; ears fulvous; feet white; fur soft, a tuft of snow-white hair behind the ears; tail rusty red beneath, then black, and bordered with white. *Hab.* Mexico.

II. *Fur short, soft, olive-brown, black- and yellow-punctulated, rarely red-washed; hairs black- and yellow-ringed. Moderate-sized or small.*

A. *Middle-sized. Tail black; fur very short, of the belly sparse; hairs black at the base, with a pale ring.*

17. *Macroxus fumigatus*.

Fur short, soft, black, very minutely punctulated with yellow; hairs black, with a small yellow subterminal band; crown, feet, and tail black; hairs of tail black to base; sides of nose, cheeks, and temple brown, punctulated with black; throat and underside only slightly covered with short, soft, distant blackish hairs.

Hab. Brazil, Upper Amazons (Bates). B.M.

Known from all the other species by the shortness of the soft black hairs.

B. *Moderate-sized. Tail black, red-washed or -varied; fur moderately soft.*

18. *Macroxus Langsdorffi*.

Sciurus Langsdorffi, Brandt, Mém. Acad. Pétersb. 1835, ii. 425, t. 11. f. 1.

Fur olive, black-and-grey mixed; hairs black, with an orange subterminal band: tail very full, clavate, black, washed with

red, especially near the end, base blackish ; hairs blackish, with long red tips.

Hab. Brazil : B.M. Rio Negro : B.M.

Var. α . Throat and belly paler. Bolivia. B.M.

Var. β . Throat and belly white. Bolivia. B.M.

19. *Macroxus brunneo-niger*.

Sciurus brunneo-niger, Castelnau, MS. B.M.

Fur blackish olive, very minutely and closely punctulated with red yellow ; hairs short, close, black, yellow-ringed ; cheeks, chin, underside of body, and inner sides and front edges of the legs rufous ; feet red, more or less black-varied : tail full, elongate, black, the hinder two-thirds red-washed ; hairs black, those of the end with a long red tip.

Hab. Brazil (Castelnau). B.M.

Smaller than *M. Langsdorffi*, the fur shorter, much darker, and more minutely punctulated.

20. *Macroxus xanthotus*.

Fur soft, close, dark olive, very minutely black- and yellow-punctulated ; sides of head and throat yellower ; chin, throat, breast, belly, and inner sides of the limbs red ; spot at the back of the ears bright yellow : tail grizzled like the back at the base, upper surface red, lower black, red-margined ; hairs black, with a red tip.

Hab. Costa Rica, Veragua, Cordillera de Tale (O. Salvin) B.M.

Very like the former, but smaller ; perhaps, from the slenderness of the tail, young ; but the chin and front of the throat are yellow red, and not grey.

21. *Macroxus ignitus*.

Fur soft, abundant, dark olive, closely and minutely black- and yellow-punctulated ; the head and outer sides of the limbs rather yellower ; back of the ears bright red bay ; cheeks, chin, and throat white ; sides of the throat, chest, belly, and inner sides of the limbs reddish yellow grey : tail grizzled like the back at the base, black at the hinder half, red-washed ; hairs yellowish or reddish, with two black rings, the upper one broad, and those of the hinder half of the tail with long red-bay tips.

Hab. Bolivia (Brydges). B.M.

22. *Macroxus griseogena*.

Sciurus ferrugineoventris (not Bachmann). B.M.

Fur olive-grey, minutely punctulated with black and yellow ;

nose, cheeks, chin, and upper part of throat, and a small spot behind the ear pale grey; throat, chest, belly, and inner sides of the legs red; tail bushy, black, red-washed, with a black tip and black under surface; hairs of tail pale brown at the base, with a broad black ring and red tip.

Hab. Honduras, Venezuela (Dyson): B.M. Santa Fé de Bogotá (Argent): B.M. Mexico (Parzudaki): B.M. Isthmus of Panama (Salvin): B.M. Costa Rica, Volcan de Cartago: B.M.

Var. Middle of the back black; spot behind the ears yellow on one side and grey on the other.

23. *Macroxus Gerrardii*.

Sciurus Gerrardii, Gray, P. Z. S. 1861, p. 92, t. 16.

Crown, back, rump, thighs, and base of tail dark, black- and yellow-grizzled; cheeks, chin, sides of neck and body, fore legs and front of thighs, and middle portion of the tail bright red-bay; middle of throat, chest and belly, and inner side of thighs pure white.

Hab. New Granada. Gray's type in B.M.

C. Tail black, grey-washed, or more or less annulated.

24. *Macroxus leucogaster*.

"*Sciurus guerlingus*, Castelnau," not Shaw.

Fur soft, full, dark olive, very closely and regularly punctulated with yellow; hairs lead-coloured, upper half yellow, with a subterminal black band and yellow tip; sides of nose and head grey, yellow-washed; chin, throat, underside of body, and inner side of limbs white; hairs white to the base: tail olive, underside black- and yellow-ringed on the hinder half; hairs elongate, yellowish, with a narrow central and very broad subterminal black ring, with a long grey or yellowish tip.

Hab. South America, Bolivia, Santa Cruz de la Sierra (Bridges): B.M., 1846, 1847. Brazil (Castelnau): B.M.

The female has six teats, far apart and nearly equidistant.

25. *Macroxus Fraseri*.

Fur black, reddish-washed; head, ears, feet, and tail black; upper part of the nose slightly varied with white hairs; hairs black, with reddish tips; hairs of the front of the back, shoulders, and outer side of the fore legs black, with a reddish-grey, narrow, subterminal band; cheeks, throat, and inner sides of limbs pale red brown; chest and belly rufous, with grey rings; hairs lead-coloured, with a red-brown tip or subterminal ring; hairs of tail black, with some intermixed grey ones, of the base of the tail black, with red ends.

Young similar, but hairs longer and underside redder; hairs red to the base, without a grey tip or subterminal ring.

Hab. Republic of Ecuador (Fraser). B.M.

The adult male has a small tuft of opaque white hairs on each side of the nape, and a similar tuft on the middle of the right side of the body; but, as there is no similar spot on the left side, I am inclined to believe they are an accidental individual variation.

26. *Macroxus tephrogaster*.

Fur soft, rather short, close, dark olive, very minutely punctulated with yellow; middle of the back blacker; hairs lead-coloured, with a yellow and black ring and a yellow tip; cheeks pale; chin, throat, underside of body, and inner sides of legs whitish grey; hairs lead-coloured, with white tips; tuft at back of ears yellow grey: tail black, whitish-washed, underside reddish, with a black border; hairs yellowish, with a very broad band and white tip.

Hab. Mexico (M. Sallé): B.M. Guatemala (O. Salvin): B.M. Bogotá (H. E. Strickland): B.M. Honduras (Dyson): B.M.

27. *Macroxus taniorus*.

Fur dark olive, closely and minutely punctulated with reddish yellow, the middle of the back rather blacker; the sides of neck and body yellower; hairs black, with minute yellow tips; cheeks yellow; chin, upper part of throat, and inner sides of the limbs grey; hairs black, with white tips; hinder part of throat, chest, and belly grey, red-washed: tail depressed, expanded, black, white-washed; under surface red brown, with black margins and grey edges; hairs reddish yellow, with two or three indistinct narrow bands, a broad subterminal black band, and a grey tip.

Hab. Guatemala (O. Salvin). B.M.

28. *Macroxus irroratus*.

Fur olive, closely, uniformly, and minutely punctulated with yellow; hairs short, close, lead-coloured at the base, black above, with a yellow tip; nose, cheeks, chin, throat, belly, and inner sides of the limbs yellow or reddish yellow; hairs lead-coloured, with yellow tips; ear-tuft small, reddish: tail depressed, black, washed with reddish yellow; hairs rather long, yellow brown, with two narrow inferior and a broad subterminal black band, and a reddish-yellow tip.

Hab. Brazil, Upper Ucayali (E. Bartlett). B.M.

Like *M. æstuans*, but rather larger, cheeks redder, tail broader,

depressed, and reddish-washed. There are three specimens: the one marked "a female" is much redder beneath than the other two, which also appear to be of the same sex.

29. *Macroxus flaviventer*.

Sciurus flaviventer, Castelnau, MS. B.M.

Fur very close, blackish olive, very closely and minutely punctulated with yellow on the head and sides of the body; middle of back blacker; hairs very short, close, black, with a yellow tip; cheeks, nose, chin, throat, and chest scarcely punctulated; under part of the body and inner side of the limbs reddish yellow, hairs yellow to the base; ear-tuft small, yellow: tail depressed, narrow, blackish, yellow-washed, especially near the end; hairs yellow at the base; upper half black, with a yellow tip.

Hab. Brazil (Castelnau). B.M.

Like *M. æstuans*, but smaller and darker, especially on the middle line of the back; the cheeks and chin yellow, like the underside; the tail depressed, pennate, very narrow.

30. *Macroxus æstuans*.

Sciurus brasiliensis, Marcgr. B. 230; Seba, i. 78, t. 48. f. 8.

Sc. æstuans, Linn. S. N. i. 88; Kuhl, Beitr. 68; Pr. Max, Abbild. t.

Myoxus guerlingus, Shaw, Z. ii. 171, t. 156.

Macroxus æstuans, Lesson.

Le grand Guerlinguet, Buff. H. N. Suppl. vii. 261, t. 65.

Fur soft, close, dark olive, very minutely punctulated with yellow; hairs very short, lead-coloured, with a narrow yellow subterminal ring and a black tip; cheeks, chin, and upper part of throat greyish; chest and beneath, and inner sides of limbs yellow or reddish yellow: tail cylindrical, black, grey-washed; hairs yellowish, with two narrow inferior and a broad black subterminal ring and more or less grey tips. Ear-tufts none.

Hab. Brazils, Para (Graham): B.M. Bay of Honduras (Warwick): B.M.

Var. 1. Chest and belly yellow in the middle, grey on the sides. Para (Graham). B.M. Female's teats four on each side, surrounded by a fulvous spot.

Var. 2. Chest and front of under surface yellowish; belly whitish grey. Brazil. B.M.

Var. 3. Chest, underside, and the inner sides of the front legs whitish grey; inner sides of hind legs and middle line of the belly slightly yellow-washed. Brazil. B.M.

Var. 4. Throat, central line of chest and belly, and inner sides

of limbs white; sides of the body and belly grey. Brazil?
B.M.

31. *Macroxus pusillus*.

Sciurus pusillus, Geoff., Desm. Mam. 337; Gray, List Mam. B. M. (part.).

Macroxus pusillus, Lesson.

Le petit Guerlinguet, Buffon, H. N. Supp. vii. 261, t. 66.

Fur soft, dark olive, yellow-grey-washed; head redder; hairs blackish from the base, with yellow-grey tips; cheeks, chin, throat, chest, and belly yellowish grey; hairs dark lead-coloured, with yellow-grey tips; ear-tufts none or very small: tail slender, cylindrical, black slightly varied with yellow; the hairs of the base yellow, with a basal and subterminal black band and a yellow tip, those of the tip black, with a yellowish base.

Hab. Tropical America: B.M. Cayenne (Buffon).

A very small species: body and head $4\frac{1}{2}$ inches long. The front of the shoulders and thighs yellower than the rest of the body.

32. *Macroxus Kuhlii*.

Sciurus leucotis, Castelnau, MS. (not Gapper).

Sciurus Kuhlii, Gray. B.M.

Sc. pusillus, Gray, L. M. B. M. 139 (not Geoff.?).

Fur soft, nearly uniform olive, slightly washed with yellowish; chin and underside rather paler and yellower; a white spot above the base of each ear; tail blackish, whitish-washed; hairs yellow, with a broad subterminal band and white tip.

Hab. Brazil (Castelnau). B.M.

See also:—

Sciurus (Macroxus) Adolphei, Lesson, Rev. Zool. 1842, p. 130.
South America.

Sciurus gilvicularis, Wagner, Münch. Akad. 1850, v. 283.
Brazil, Rio Madeiro (Wagner).

Sciurus igniventer, Natterer, Wieg. Arch. 1842, i. Rio Negro
(Natterer).

Sciurus pyrrhonotus, Natterer, Wieg. Arch. 1842, i. Brazil,
Borba (Natterer).

Sciurus variabilis, I. Geoff. Mag. Zool. 1832, t. 4; S. Baird, M.
N. A. 283. Columbia (I. Geoff.).

Sciurus stramineus, Eydoux, Zool. de la Bonite, t. 9. Peru.

Sciurus tricolor, Tschudi, Fauna Peru. 156, t. 11 (Wagner).
North Peru (Tschudi).

Sciurus aurocapillus, Denny, P. Z. S. 1847, p. 38, of Jamaica, is
a bird, and should have been called *Seiurus*.

III. *Fur rather harsh, abundant; sides with a narrow reddish streak.*

33. *Macroxus dimidiatus*.

Sciurus dimidiatus, Waterhouse, P.Z.S. 1840, p. 21; S. Baird, M.N.A. 283.

Fur rather harsh, abundant, reddish iron-grey; hairs short, close, black at the base, with a broad pale-brown ring, a dark-brown subterminal ring, and a white tip; upper part of head, shoulders, legs, thighs, and feet, and a streak along each side of the body rufous; sides of the head, chin, and beneath yellow: tail reddish, black-varied; hairs reddish brown, with a broad black subterminal ring and reddish end, and grey base.

Hab. South America? (Waterhouse's type, not in a good state.) B.M.

This specimen was purchased at a sale with some South-American squirrels; but it has much more the appearance of an African squirrel. No other specimen of this squirrel has occurred to me; so the true habitat is still doubtful.

LI.—*Synopsis of the Species of Burrowing Squirrels (Tamias) in the British Museum.* By Dr. J. E. GRAY, F.R.S., V.P.Z.S.

THE Ground-Squirrels form a very natural group, and are marked very similarly externally, so much so that it is very difficult to distinguish them from each other. But when you have a series of specimens from the same country, and from different localities, you can have no doubt that they are very distinct species, though it is very difficult to record the difference in words; for no sooner do you think that you have hit upon a distinctive character that can be written down than you find it in some of the other specimens.

The different species vary somewhat in size; but then the specimens from the same country vary a little in this respect; yet there is an average size that is characteristic of the species. *T. striatus* of Europe and North Asia is the largest; and then follow *T. Townsendii*, *T. americanus*, then *T. Hindsii* and *T. quadrimaculatus*; and *T. quadrivittatus* is the smallest.

A. *Tail as long as the body; back with five longitudinal equidistant black streaks, separated by four pale streaks; face with a white streak extended behind, above, and under the eye.*

a. *The pale streaks wide, wider in the middle. Larger.*

Tamias striatus, Linn.

Pale ash-grey, yellowish grey in the middle, grey on the sides.

Hab. Europe: B.M. Asia, Altai: B.M.